University of Oklahoma
Gallogly College of Engineering

Sep 9th, 2016

Dear Teachers and Counselors,

On behalf of the University Of Oklahoma College Of Engineering, I would like to extend this invitation to you and your students to participate in the 104th annual Open House event this fall. This year's Open House will be held on **Friday, October 28th, 2016**. We hope you are just as ready and excited for the 104th Annual College of Engineering Open House as we are!

The design competitions we will be sponsoring this year include: Egg Drop, Mouse Trap Powered Vehicle, Model Bridge, Ping-Pong Ball Launcher, Tower Bridge Construction, Miniature Oil Derrick, Design, Build, Fly Glider, and Pipe Rally. With such a wide-range of competitions available to your students, many opportunities are presented for every individual to test their skills.

In addition to the academic exams and design competitions, many other learning experiences will be open to your students throughout the day. The Gallogly College of Engineering tours allow them to learn more about the College's history and traditions. They will also have the opportunity to ask questions while touring labs where professors and students apply their trade.

Please take advantage of all that the 2016 College of Engineering Open House has to offer. I hope your students will be challenged, learn more about our engineering programs, and, most importantly, have an enjoyable and memorable time with us. I know that without your support, this event could not be successful.

Please visit http://www.ou.edu/content/coe/K-12/hsoh/ **to find the online registration form.** Registration must be completed online before Friday, Oct. 21st.

If you should have any questions, please feel free to contact us at goengineering@ou.edu or (405) 325-4490. We will work to address your concerns as quickly as possible.

Sincerely,

Jackie Foos
Director of Recruitment and Outreach
College of Engineering
University of Oklahoma

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Overview

Since 1912, the students of the University of Oklahoma have had the pleasure of extending an invitation to area high school students to participate in the Engineering Open House, the oldest and most successful event on the University of Oklahoma campus. High school students from across the state come to Norman each year to sample what the OU Engineering programs have to offer.

Academic testing and engineering design competitions are the highlights of this event. These competitions are designed to allow students to display their knowledge of math, science, and logic areas. The annual Engineering Open House allows tomorrow's engineers and scientists to get started today.

Academic testing is divided into four categories: Mathematics, Chemistry, Physics and Computer Science. The engineering design competitions include the Egg Drop, Mouse Trap Vehicle, Model Bridge, Ping-Pong Ball Launcher, Tower Construction, Miniature Oil Derrick, Design, Build, Fly Glider, and Pipe Rally. Your students will compete with other students from across Oklahoma, and students who display exceptional knowledge and skill will be awarded certificates.

In order for you and your students to better appreciate what the Gallogly College of Engineering has to offer, an information fair and tours of the Gallogly College of Engineering are available. The tours will allow you to view two main engineering buildings to examine projects currently in progress, and to meet representatives from various engineering disciplines.

To show our appreciation for your efforts as a high school teacher or counselor, a free counselor reception room with refreshments will be provided in ExxonMobil Lawrence G. Rawl Engineering Practice Facility.

The students of the Gallogly College of Engineering sincerely hope that you will make plans to attend our 104th annual Open House.

Registration and Payment Instructions

Registration will be online. Please visit http://www.ou.edu/content/coe/K-12/hsoh.html/ to find the online registration form. Registration must be completed by **Friday, Oct. 21** in order to compete. On the registration form please include a school e-mail and school phone number that we may contact should we have any questions about your registration.

For both the Scholastic Testing and Design Competition registrations please list all students that would like to participate in the appropriate text boxes separated by commas.*

The cost of registration is $5 per student. The registration fee may be paid by check, money order, invoice, or you can choose to pay upon arrival (cash, check, or money order). Please select the best choice for your school. Should you have any questions regarding payments, please contact Colleen Wilhelm at 405-325-0467 or collen.wilhelm@ou.edu. Please direct all other questions or concerns to goengineering@ou.edu or 405-325-4490.

Please make checks payable to The University of Oklahoma and send the payments to:

Attn: Colleen Wilhelm
202 W. Boyd Street, Room 107
Norman, OK 73019

* Please register early as seating is limited for scholastic testing.

Scholastic Testing Rules*

Sponsored by: TBA

The following schedule has been established for the academic tests:

Mathematics	9:00-9:30	Chemistry	9:45-10:15
Physics	10:30-11:00	Computer Science	11:15-11:45

Tests will last 30 minutes. The doors will close **FIVE** minutes before the start of each exam. Students must remain in the testing room throughout the duration of the exam.

The tests are designed to challenge the students. Consequently, students may not finish an exam or be able to solve all of the problems in a given subject.

The sponsor for each school will be given one pencil for every student attending the Open House. Students may use these pencils or bring their own. We will **NOT** be supplying #2 pencils for the exam in the exam room. Students will be responsible for bringing a scientific calculator. **Programmable and graphing calculators will NOT be allowed.** Scratch paper and any necessary equations will be provided.

All students will be monitored to prevent any misconduct. Any student found cheating will be disqualified from all academic competitions. Academic Misconduct is defined in the University of Oklahoma Student Code.

The decision of the testing chair is final. Individual results and rankings will be announced at the awards presentation in the afternoon.

To assist your students in preparing for the exam, a list of subject material is given below. This material is not definite; however it will provide a general guideline for study. The testing committee reserves the right to include content of an equivalent level to that listed below:

- Mathematics—algebra, geometry, trigonometry, probability and combinatorics, mathematical reasoning and logic, complex numbers, limits, logarithms, derivatives, integrals
- Chemistry—atomic and molecular structure stoichiometry, gas laws, thermochemistry and thermodynamics, chemical reactions, acids and bases, reduction and oxidation, intermolecular forces, periodicity, solutions, kinetics, equilibrium
- Physics—vectors, acceleration, force, work, energy, power, simple machines, impulse, momentum, angular velocity & momentum, elasticity, circuits, resistance, voltage, current magnetic fields, waves, interference, diffraction
- Computer Science (This is not a language specific test)—computer history, general hardware and software fundamentals, operations languages and systems, programming logic

*The room assignments are subject to change due to active classes.

Open House 2016-Schedule of Events

Event	Time	Location
Registration	7:30 – 9:00	Devon Energy Hall Lobby
Counselor's Refreshments	9:00 – 12:00	
OU/Engineering Info Booths	9:00 – 12:00	
College of Engineering Tours	9:00 – 12:00	Depart from Rawl Engineering Practice Facility Lobby (Depart every thirty minutes)
Design Events		
Egg Drop	9:00 – 1:00	TBA
Mouse Trap Vehicle	9:00 – 1:00	TBA
Model Bridge	9:00 – 1:00	TBA
Ping Pong Ball Launcher	9:00 – 1:00	TBA
Tower Construction	9:00 – 1:00	TBA
Miniature Oil Derrick	9:00 – 1:00	TBA
Design, Build, Fly Glider	9:00 – 1:00	TBA
Pipe Rally	9:00 – 1:00	TBA
Scholastic Testing		
Mathematics	9:00 – 9:30	TBA
Chemistry	9:45 – 10:15	TBA
Physics	10:30 – 11:00	TBA
Computer Science	11:15 – 11:45	TBA
COE Information Session	1:15 – 1:45	TBA
Award Presentation	2:00 – 2:30	TBA

Egg Drop Competition

Sponsored by: TBA

Objective

The objective of this competition is to design and construct a container which will prevent two raw eggs from breaking when the container is dropped. The competition will be judged on the number of times the container can be dropped without breaking the eggs. The eggs may be dropped at several different heights, up to three or four stories.

Judging Criteria

- Height of the last drop; or height from which the eggs did not break.
- Originality, feasibility and reusability (in the case of a tie in highest drop.)

Design Principals

The following principals constrain the design and materials used so that the competition is safe and does not damage OU property. The judges will not allow a container to be dropped if they deem that it does not follow these principles:

Containers must:

1) Not be dangerous to spectators while falling or after impact
2) Not damage the landing surface
3) Not make a mess that cannot be quickly picked up after impact

Rules

The following rules are based on the principals listed above. However, the following rules do not exhaust every possibility and the judges have final discretion of what is not allowed within the design principals.

- Containers must be ready for loading at the site of competition. Only the eggs supplied by competition officials on site may be used.
- The container may not be "fixed" between drops, except to replace the eggs after inspection.
- Containers must be designed so that they may be dropped from any position. They must also be immediately reusable.
- Container must entirely fit within a 12 in × 12 in × 12 in cube before and within one (1) minute of drop. It must hold two (2) eggs that touch before and after release.
- Container must weigh less than 5 lbs or 2.27 kg.
- The container must hit a 30 ft × 30 ft landing zone on every drop.
- The judges must be able to access the eggs for inspection within one (1) minute of landing.
- No parachutes allowed. This will be strictly enforced.
- Must not contain:
    - liquid or gel
    - Food Products
    - Many small pieces (such as shredded paper)
    - Styrofoam in any form. To be absolutely clear, the judges may consider any material with the suffix FOAM to be Styrofoam. A strict interpretation of this rule will be applied to all containers.
    - a large quantity of metal (such as a steel frame)
- Must not break into many small pieces upon impact

*In the case of inclement weather, Egg Drop will relocate indoors.

Mousetrap Powered Vehicle Competition

Sponsored by: TBA

Objective

The objective of the competition is to design and construct the most power efficient vehicle possible, powered solely by a single mousetrap.

Vehicles will be tested on a first come, first serve basis. The contestant shall place the vehicle behind the designated starting line, and release it. The contestant may not aid the vehicle in any way after releasing it, and push starts will not be allowed. The contest will be held indoors on a smooth surface. Each contestant will be permitted two attempts, with the better run used to calculate his or her score. Distance and time will be measured from the starting line to the vehicle at the time it stops OR the point when the vehicle strays outside the three (3) foot wide track.

Judging Criteria

The vehicle will initially be evaluated purely by distance traveled within the lane. Once the vehicle stops or leaves the track, distance will be measured to the wheel farthest from the starting line. In the event of a tie, or multiple vehicles reaching the end of the lane, the vehicle with the shortest elapsed time will be judged the winner.

Rules

- The vehicle must be the contestant's original design. No vehicles constructed from kits, or closely resembling kits, will be allowed to enter.
- Vehicles may be built from any safe material.
- All power must come solely from a single mousetrap. Mousetraps can be of any size ("rat" size traps are also allowed) as long as there is only one.
- The vehicle must fit in a 2 ft × 2 ft × 2 ft cube.
- The power mechanism must be contained within the vehicle. All parts of the vehicle must remain with the vehicle throughout the run.
  (i.e. no catapults or drops)
- The vehicle may not at any point become completely airborne.
- The vehicle must stay within the three foot wide lane.
- The vehicle and time will be stopped after ninety (90) seconds.
- The vehicle must travel at least one foot to be judged.
- Appropriate team names

Model Bridge Competition

Sponsored by: TBA

Objective

The objective of this competition is to design and build a model bridge using only balsa wood and glue. The bridge is to span a clear distance of 24 inches and to support a downward load of at least 25 pounds, applied at the center of the bridge. Failure to follow any rule will result in disqualification. The use of a material not on the materials list will result in disqualification.

Materials

- Untreated balsa wood
- Elmer's Carpenter's Glue (Yellow tinted glue may be used.)
- Glue may only be used to bond two pieces of wood together. (Coating the members is not allowed and will result in disqualification.)

Dimensions

- Height – Bridge must be between four (4) and six (6) inches high, measured from the highest point to the lowest point of the bridge.
- Width – Bridge must be between three (3) and five (5) inches wide.
- Length – Bridge must be within a quarter (¼) inch of twenty-six (26) inches long and must be able to span a clear unsupported length of twenty-four (24) inches.

Weight

- Maximum permissible weight is sixteen (16) ounces (454 grams) including the loading platform as described in the fifth bullet point of **Bridge Members**.

Bridge Members

- No member of the bridge may have a cross-sectional area (width × thickness) of more than one-quarter inch squared (1/4 in^2). In addition, no member may have any cross-sectional dimension greater than one inch (see attached diagrams). Two or more pieces of wood placed together lengthwise will be considered a single member if they are glued together or are placed closer than one-sixteenth (1/16) of an inch.
- No members of the bridge may be laminated together. Lamination is defined as any connection of two members at an angle of less than 45 degrees being continuously glued. If members meet at an angle less than this, gluing can only be ½" long and must be spaced greater than 2 inches apart.
- The bridge deck (roadway decking) must be at least three (3) inches wide for the entire length of the bridge. (It will be necessary to use more than one member to meet the conditions specified in the first bullet point of **Bridge Members**.)
- The bridge must be capable of allowing a vehicle 2½ inches wide by 3½ inches high to pass unimpeded along the entire length of the bridge. (The bridge deck must be flat.)
- There will be a loading platform across the width of the bridge at the apex (see attached diagram). The loading platform will be included in the weight calculation.

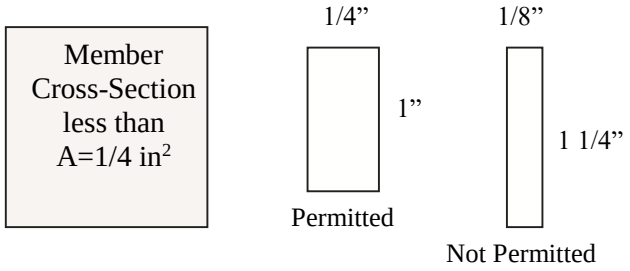
Loading Procedure

Load will be applied gradually and continuously to the loading platform using a mechanical loading device. The minimum acceptable bridge capacity is twenty-five (25) pounds. The bridge will be loaded until failure occurs. Failure is defined as the point at which the bridge will no longer support additional load. This point may occur prior to total collapse. The load at failure will be recorded.

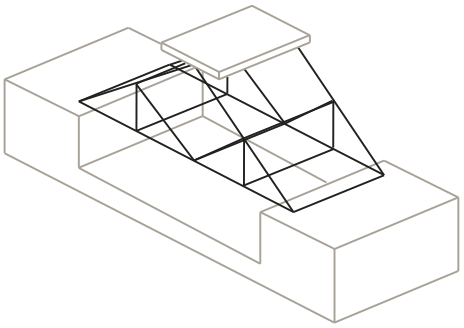
The bridges will be judged on the basis of an efficiency ratio, calculated by the equation given below. **The bridge with the highest efficiency ratio will be the winner.**

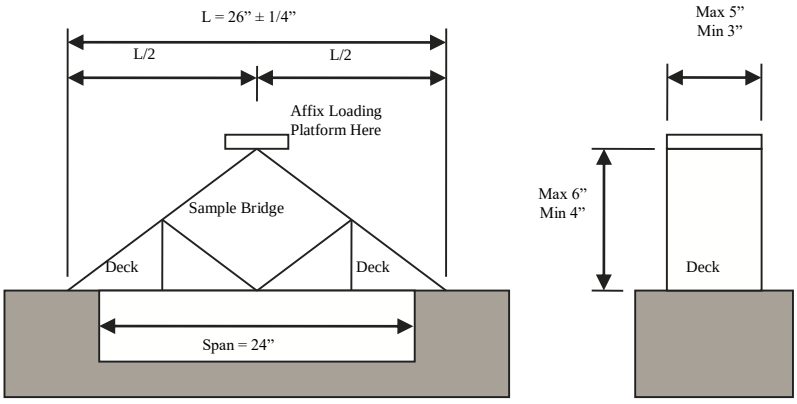
Efficiency Ratio = (Failure Load) / (Bridge Weight)

Cross-Section Diagram



Model Bridge Diagram





Ping Pong Ball Launcher Competition

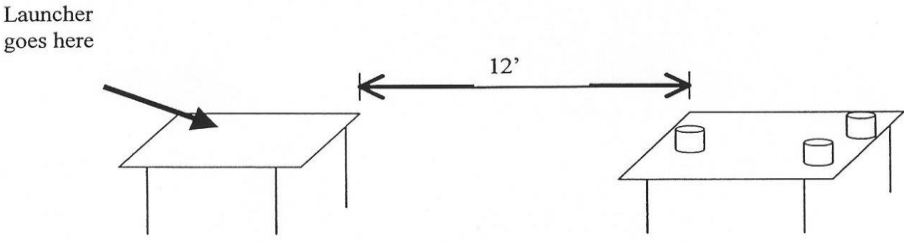
Sponsored by: TBA

Objective

The objective of this competition is to design and build a launcher which can catapult ping pong balls at targets (coffee cans) approximately twelve (12) feet away. The launcher must shoot only one ball at a time and should be readily reloadable in order to launch as many balls as possible within a three (3) minute time frame. Weight of the launcher is not a factor, although it should be heavy enough to remain stable during launches. Students will work in teams of two (2).

Rules

- All entries must be made with one standard household mousetrap. This is the only acceptable supply of energy. The mousetrap may be modified to launch ping pong balls, however, as previously stated, only the spring tension of the trap may be used as the force to shoot the balls.
- All parts of the mousetrap must be visible.
- Targets will consist of three (3) 26 ounce empty coffee cans. The opening on the cans is approximately five (5) inches. The cans will be arranged in a triangular fashion with one point facing the launcher.
- One team member will operate the launcher while the other collects the stray balls to be re-launched. The team will earn points for each ball remaining in targets at the end of the three (3) minute time frame. Launcher and targets will be on separate tables. The tables will be three (3) feet high and twelve (12) feet apart. The balls must cover the twelve (12) foot distance.
- The launcher may be hand-held, but must rest on the table during launches.
- Adjustments are permitted during the time frame but no additional time will be provided.
- Targets will be worth 10, 20 and 30 points. The targets will be labeled at the competition.
- All parts of the launcher must remain on the launching table at all times.
- **The launcher shall not break the plane of the front edge of the launch table.**
- Appropriate team names
- Failure to follow any rule will result in disqualification.



Tower Construction Competition

Sponsored by: TBA

Objective

This competition will require no construction before the competition day, but planning and practice will prove pertinent. The competition consists of up to four-person teams competing to build the highest tower in the least amount of time. The winning team will be the one with the best height to time ratio. The structure may be of any shape or design, but the following rules will apply. Failure to follow any rule will result in disqualification.

Rules

- The finished tower must consist only of materials provided by the contest officials. (No glue, gum, etc. will be permitted.) This includes a pre-constructed base, supports, etc. Any tools or construction aids must be removed before timing will stop.
- White paper and tape will be made available in a reasonable quantity. Availability should not be a factor in design; contest officials will provide unlimited materials as long as constructive principles are sought, that is, until waste and squandering become apparent. (Reasonable quantity will be determined by the judges in order to avoid "piling" of paper instead of "constructing.")
- A 3 ft. × 3 ft. space will be provided on a concrete floor. The base of the structure must not stretch outside of this marked boundary.
- Construction time is at the discretion of the team members, with a maximum time of five (5) minutes and a minimum time of (3) minutes. This window will allow the team to complete a planned design and stop when they feel their height/time ratio is at a maximum.
- Any structure which does not remain standing for at least one (1) minute after timing of construction stops will be disqualified.
- The team with the highest ratio of height/time will be the winner.
- Appropriate team names

Miniature Oil Derrick Competition

Sponsored by: TBA

Objective
Build a miniature oil derrick using the given supplies that will support the heaviest drill string.

Materials (Supplied by SPE)

- 4 Dowel Rods
- 20 Popsicle Sticks
- Dental Floss
- 1 ft of Duct Tape

** SPE will also supply all necessary tools*

Specifications

- The derrick must fit over a hole that is 1" in diameter.
- There must be a place on the derrick to attach the fishing line for testing.
- The fishing line must be attached at least 8" above the table level.
- Appropriate team names

Time Limit

- 1.5 hours for building. Judging will take place after all building is completed.

Judging
The derrick will be placed on a flat table over a 1" diameter hole. Fishing line will be attached to the derrick and lowered through the hole. At the end of the line, there will be weights. Progressively more weight will be applied to the line until the structure collapses. The structure that supports the most weight will be the winner. Prizes will be awarded for first and second place. There will also be a Best of Show award for creativity in design.

Design, Build, Fly Glider

Sponsored by: TBA

Objective

The objective of the competition is to design, build, and fly a miniature glider to maximize flight performance. Distance flown and weight will be measured. A winner will be determined according to the judging criteria.

Judging Criteria

- Two flight attempts are given, with the longest distance taken for the score.
- Overall score = flight distance/weight (ft/g)

Rules

- The glider will be gently hand launched (thrown, i.e. no assistive devices) from behind a designated line.
- Come up with a team name and even a plane designation. (This glider is your baby, be proud of it!)
- The name of the game is creativity, but remember a glider design is useless if a pilot couldn't operate a full-scale one! (i.e. no Frisbees, paper wads, or javelins, etc.)
- Your aircraft needs to be able to handle a "tip test." This means that when supported only at the wing-tips, your glider remains rigid and doesn't sag.
- The glider's wingspan must be greater than 12 inches but less than 30 inches.
- Any aircraft in violation of these rules may fly but will not be scored.

- Appropriate team names

Material allowances

- No "all-paper" gliders. Paper components are fine but your glider must have a rigid structure made from some other material. Remember, it must survive the tip test before flying.
- No rubber bands.
- No engines or mechanical devices (such as torsion driven propellers).

Pipe Rally Description and Rules

Sponsored by: TBA

Objective

Imagine living in a small, rural village where the only source of water is a mountain lake. In order to have a reliable water source, you and your team have to design a water transport system from the top of a mountain to a village located at the bottom of the mountain. The teams will be competing against each other to build the most efficient system in the shortest amount of time to get water from one end to the other. After the competition, the team with the fastest time will be given a prize.

Judging Criteria

- The team who has water flowing through the finish line first will be the winner of that race, but both times will be recorded

Rules

- Two teams of four will be given an identical set of pipe and connectors.
- Once time starts, they must have a complete pipe system where the water will pass through all obstacles and comes out at the finish line.
- Once they have finished their system, teams will pour water from a certain height to flow through the completed piping section.
- Students will be allowed to hold the pipes in place while pouring the water in order to provide structural support if necessary.
- The team with the first, second, and third fastest times at the end of the competition will be given prizes.
- Appropriate team names

Materials

- All materials will be provided at the competition

*In the case of inclement weather, Pipe Rally will relocate indoors.

Directions from I-35 to Felgar Street Unloading Zone

1. Take exit **109** east onto **Main Street** toward S **Jenkins Street.**
2. Continue on **Main Street** for about 3 miles.
3. Use the right lane to Turn **Right** (south) onto **S Jenkins Ave**.
4. Continue for about **.5** a mile.
5. Turn **Right** (east) onto **Boyd Street.**
6. Turn **Left** (south) onto **Asp Ave**
7. Turn **Left** (east) onto **Felgar Street.**
8. A drop off zone will be marked for students and counselors to disembark.
9. <u>For parking</u>: Proceed east on Felgar to Jenkins Avenue.
10. At Jenkins Avenue turn right (south).
11. Follow Jenkins Ave for approximately 1.5 miles until you reach the Lloyd Noble Center.
12. Recommended parking is on the North side of the Lloyd Noble Center, where shuttles to campus depart every 5-10 minutes beginning at 7am.

The shuttle drop off point on Campus is the north end of Van Vleet Oval. After arrival on campus you may reach the engineering facilities by following the sidewalk northeast to Asp Avenue. LGR Engineering Practice Facility is on the northeast corner of Jenkins and Felgar Street